Space Weather Forecast

Issued on Friday 21 February 2025 at 12:08 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate flares. Possible glancing CME's day 3 (23 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only occasional common class flares observed, the largest from a bipolar region approaching the west limb. There are seven sunspot numbered regions on the visible disc, and several small un-numbered regions. Most numbered regions on the visible disc are relatively small and simple, with little growth or development observed. However, two modestly sized regions near south-centre disc remain the most notable regions on the disc. Both have exhibited a slight increase in spot number or area, with the eastern-most showing a greater rate of development and having formed a more complex magnetic structure within a small intermediate spot group. Some new minor regions have emerged in the southwest and northeast quadrants, with the region in the northeast showing the greatest rate of growth of all of these regions. Also, small returning region has recently rotated from the northeast limb.

A filament was observed to lift off from the northeast, beginning around 21/0100UTC, with a clear north directed CME emerging soon after in coronagraph imagery. This has been modelled with results pending, however it is not expected to give any impacts. A filament was also observed to lift off from the southeast, beginning around 21/0500UTC, with a narrow, south directed CME observed. This has also been modelled with results pending, but similarly no impacts are anticipated at Earth.

Solar Wind / Geomagnetic Activity: Solar winds showed a steady decline from near 450km/s to 320km/s, indicating the declining influence of a previous coronal hole feature. The Interplanetary Magnetic Field was Weak, with the north-south component also Weak, varying from positive (northward) until around 20/2100 UTC, then switching to mainly negative (southward). Geomagnetic activity was Quiet (Kp 0-1), apart from one Unsettled (Kp 3) interval 20/0000-0300 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be generally Low, with a chance of isolated Moderate class flares.

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Solar Wind / Geomagnetic Activity:

A CME followed a Common class flare at 19/2345 UTC from a now decayed region in the southwest, with modelling results indicating a chance of a glancing blow around the middle of the day (UTC) on day 3 (23 Feb). There is a lower chance of another CME brushing Earth on day 3, although earlier in the day, from weak flaring that occurred in the vicinity of a modestly sized bipolar region near centre disc at the time.

No significant solar wind enhancements are expected over the next few days, with a gradual easing trend within background levels expected. However, on day 3 (23 Feb) there is a chance of two glancing CME's as mentioned above. Late Day 4 (24th) a weak solar wind enhancement may occur associated with a small coronal hole feature in the northern hemisphere.

Geomagnetic activity is forecast to be mainly Quiet with a chance of isolated Unsettled intervals days 1 and 2 (21st and 22nd). Days 3 and 4 (23 and 24 Feb) activity may increase Unsettled to Active at times, with a chance on day 3 for an increase to Minor Storm levels due to a possible glancing CME's and a slight chance on day 4 with the possible arrival of a weak solar wind enhancement.

Energetic Particles / Solar Radiation: The count rate of energetic particles is forecast to persist at background levels.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	1	1	30	20
Strong	**G3**	No	1	1	5	5
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	No	40	40	50	50
Very Active	R3-R5 (X Class)	No	5	5	5	5

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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